

AMENDMENTS TO THE SPECIFICATION:

Please change the title of the application to "REMOVABLE TIP FOR LASER DEVICE."

Please delete the text in the SUMMARY OF THE INVENTION from page 4, line 14 through page 10, line 21 inclusive.

Please add the following paragraphs in the Specification, under the heading SUMMARY OF THE INVENTION:

--In one aspect of the invention, an applicator for use with a laser device housing comprises an applicator body mountable for motion in the housing, and an applicator distal end affixed to the body and positionable substantially in a focal plane of the laser device by motion of the body when at least a minimum amount of pressure is applied to the distal end by contact with a patient's skin. In a further aspect, the distal end includes a hole formed in the distal end for passing through a laser beam focused by the laser device to a focal point in the focal plane. In yet another aspect, a preselected amount of pigment may be disposed on the distal end for marking the patient's skin.

In a still further aspect of the invention, a method for forming an applicator for use with a laser device housing comprises selecting an applicator body mountable for motion in the housing, and affixing an applicator distal end to the body to be positionable substantially in a focal plane of the laser device by motion of the body when at least a minimum amount of pressure is applied to the distal end by contact with a patient's skin.--

Please insert the following paragraphs at page 14, line 14, before paragraph [0075], immediately following the heading DETAILED DESCRIPTION:

--The present invention employs a laser to perforate or alter the skin of a patient for removal and subsequent analysis of interstitial fluid. These measurements can then be used to approximate analyte concentrations in other body fluids, such as blood. Prior to application, the care giver properly selects the wavelength, energy fluence (energy of the pulse divided by the area irradiated), pulse temporal width and irradiation spot size so as to precisely perforate or alter the target tissue to a select depth and eliminate undesired damage to healthy proximal tissue. After perforation or alteration, interstitial fluid is allowed to propagate to the surface of the skin for collection and testing.

According to one embodiment of the present invention, a laser emits a pulsed laser beam, focused to a small spot for the purpose of perforating or altering the target tissue. By adjusting the output of the laser, the laser operator can control the depth, width and length of the perforation or alteration as needed, such as to avoid drawing blood into the interstitial fluid sample.

In another embodiment, continuous-wave or diode lasers may be used to duplicate the effect of a pulsed laser beam. These lasers are modulated by gating their output, or, in the case of a diode laser, by fluctuating the laser excitation current. The overall effect is to achieve brief irradiation, or a series of brief irradiations, that produce the same tissue permeating effect as a pulsed laser.

The term "perforation" is used herein to indicate the ablation of the stratum corneum to reduce or eliminate its barrier function. The term "alteration" of the stratum corneum is used herein to indicate a change in the stratum corneum which reduces or eliminates the barrier function of the stratum corneum and increases permeability without ablating, or by merely partially ablating, the stratum corneum itself. A pulse or pulses of infrared laser radiation at a subablative energy of, e.g., 60 mJ using a TRANSMEDICA™ International, Inc. ("TRANSMEDICA™") Er:YAG laser (see U.S. Patent No. 5,643,252, Waner et al., which is incorporated herein by reference) with a beam of radiant energy with a wavelength of 2.94 microns, a 200 μ s (microsecond) pulse, and a 2 mm spot size) will alter the stratum corneum. The technique may be used for transdermal drug delivery or for obtaining fluid samples from the body. Different

wavelengths of laser radiation and energy levels less than or greater than 60 mJ may also produce the enhanced permeability effects without ablating the skin.

The mechanism for this alteration of the stratum corneum is not certain. It may involve changes in lipid or protein nature or function or be due to desiccation of the skin or mechanical alterations secondary for propagating pressure waves or cavitation bubbles. The pathway that topically applied drugs take through the stratum corneum is generally thought to be through cells and/or around them, as well as through hair follicles. The impermeability of skin to topically applied drugs is dependent on tight cell to cell junctions, as well as the biomolecular makeup of the cell membranes and the intercellular milieu. Any changes to either the molecules that make up the cell membranes or intercellular milieu, or changes to the mechanical structural integrity of the stratum corneum and/or hair follicles can result in reduced barrier function. It is believed that irradiation of the skin with radiant energy produced by the Er:YAG laser causes measurable changes in the thermal properties, as evidenced by changes in the Differential Scanning Calorimeter (DSC spectra as well as the Fourier Transform Infrared (FTIR) spectra of stratum corneum. Changes in DSC and FTIR spectra occur as a consequence of changes in molecules or macromolecular structure, or the environment around these molecules or structures. Without wishing to be bound to any particular theory, we can tentatively attribute these observations to changes in lipids, water and protein molecules in the stratum corneum caused by irradiation of molecules with electromagnetic radiation, both by directly changing molecules as well as by the production of heat and pressure waves which can also change molecules.

Both perforation and alteration change the permeability parameters of the skin in a manner which allows for increased passage of body fluids or pharmaceuticals across the stratum corneum.

The term "lyse" is used herein to indicate the breaking up of the epidermis layer covering a microblister. The energy pulse used to accomplish this is between the energy required for ablation and sub-ablation.--